

INSTRUCTION MANUAL

COLOR VIDEO SOUNDER

FF-88



Icom Inc.

IMPORTANT

READ ALL INSTRUCTIONS carefully and completely before using the video sounder.

SAVE THIS INSTRUCTION MANUAL —
This instruction manual contains important safety and operating instructions for the FF-88.

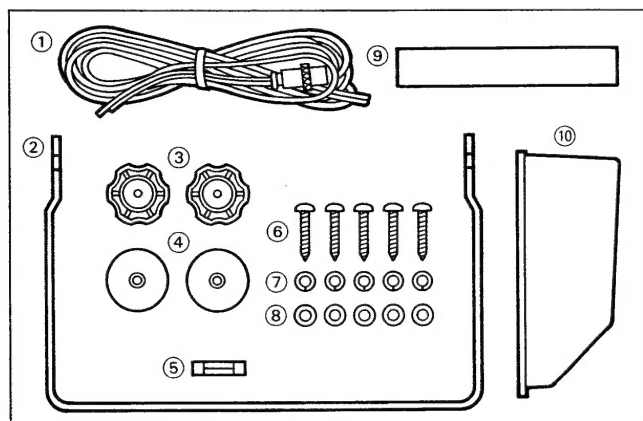
FOREWORD

Thank you for purchasing Icom's **FF-88 COLOR VIDEO SOUNDER**.

This video sounder uses an 8 bit CPU and high resolution color CRT, so you can detect fish schools, plankton, or the sea bottom clearly in 12 colors.

If you have any questions regarding the operation of the FF-88, contact your nearest authorized Icom Dealer or Service Center.

UNPACKING



Accessories included with the FF-88:	Qty.
① DC power cable	1
② Mounting bracket	1
③ Mounting screw knobs	2
④ Rubber washers	2
⑤ Spare fuses (5 A)	1
⑥ Self-tapping screws (M6 x 30 mm)	5
⑦ Spring washers (M6)	5
⑧ Flat washers (M6)	5
⑨ Sponge	1
⑩ Viewing hood	1

CAUTIONS

WARNING! NEVER disassemble the video sounder, or touch internal parts. High-voltage (more than 1000 V) is used in the video sounder. This will cause fatal electrical shock.

NEVER let metal, wire or other objects touch any internal part of the video sounder.

NEVER place the video sounder within the reach of children or babies at any time.

NEVER expose the video sounder to rain, saline water or any liquid.

NEVER connect the video sounder to AC or more than 40 V DC. This will ruin the video sounder.

AVOID using the video sounder near any magnetic materials like a loudspeaker or large power transformer as they cause a partial shading on the CRT display.

AVOID placing the video sounder near heating equipment or in direct sunlight or where hot or cold blows directly on it.

AVOID using the video sounder in areas where the temperature is over +50°C or under 0°C.

AVOID using strong agents such as benzine or alcohol for cleaning the video sounder as they may damage the surfaces.

WARNING: DO NOT try to install a transducer by yourself. Drilling your boat is necessary for installation. If the transducer is installed incorrectly, the boat will sink in the worst case. **BE SURE** to ask your boat dealer to install a transducer.

EXPLICIT DEFINITIONS

The following explicit definitions apply to this instruction manual.

WORD	DEFINITION
WARNING	Personal injury, fire hazard or electrical shock may occur.
CAUTION	Equipment damage may occur.
NOTE	If disregarded, inconvenience only. No personal injury, fire hazard, or electrical shock.

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6-2 MENU 1

All descriptions on pgs. 13 and 14 must be read after selecting the MENU 2 display. See p. 12 for the display selection.

■ Key panel backlighting [ILLUM]

The backlighting of the key panel can be turned ON and OFF for your convenience.

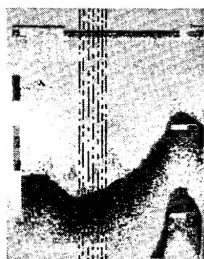
- 1) Push [UP] and [DOWN] to set the cursor to "ILLUM" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "ILLUM" turn red.
- 3) Push [UP] or [DOWN] to select "ON" or "OFF."
 - The selected condition turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "ILLUM" turn white.

■ Interference reduction [IR]

This function reduces the interference from other video sounders or from the generator of your ship. The function can be turned ON and OFF for your convenience.

- 1) Push [UP] and [DOWN] to set the cursor to "IR" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "IR" turn red.
- 3) Push [UP] or [DOWN] to select "ON" or "OFF."
 - The selected condition turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "IR" turn white.

Interference from other video sounders



IR "ON"



■ Noise reduction [NR]

This function suppresses background noise caused by dirty water, etc. Select the desired reduction level among levels 1 ~ 4 or Function OFF (0).

- 1) Push [UP] and [DOWN] to set the cursor to "NR" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "NR" turn red.
- 3) Push [UP] and [DOWN] to select the desired level.
 - The selected level turns red.

Level	Description	Function
0	Function OFF	All noise remains.
1	Min. noise reducing	Blue noise is reduced.
2		Gray noise is reduced.
3		Cyan noise is reduced.
4	Max. noise reducing	Green noise is reduced.

- 4) Push [BRT/SET] to set the value.
 - Cursor and "NR" turn white.

NOTE: If NR is set to level 3 or 4, very small fish schools will not be displayed on the screen.

■ Transmit pulse [PL]

The width of the transmission pulse can be changed to either normal or long.

- 1) Push [UP] and [DOWN] to set the cursor to "PL" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "PL" turn red.
- 3) Push [UP] or [DOWN] to select "NORM" or "LONG."
 - The selected condition turns red.

Pulse width	Normal	Long
Distance resolution	Good	Bad
Detection ability	Bad	Good

Effective uses

Normal pulse Discrimination of fish school distribution and finding fish on the sea bottom.
 Long pulse Searching deep waters or finding small fish schools.

- 4) Push [BRT/SET] to set the condition.
 - Cursor and "PL" turn white.

■ Transmit power [TX POWER]

(Only for 600 W type)

The transmit power can be changed. Use "MAX" power when searching deep sea floors or for small fish. Use "MIN" power when searching shallow sea floors or for big fish.

- 1) Push [UP] and [DOWN] to set the cursor to "TX POWER" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "TX POWER" turn red.
- 3) Push [UP] and [DOWN] to select "MIN," "MED" or "MAX."
 - The selected condition turns red.

MIN	Minimum power
MED	Medium power
MAX	Maximum power

- 4) Push [BRT/SET] to set the condition.
 - Cursor and "TX POWER" turn white.

■ Bottom discrimination [DISCR]

The bottom discrimination function removes the color of the sea bottom (reddish brown, red and purple) for easy discrimination of fish schools from the sea bottom. This function can be turned ON and OFF for your convenience.

- 1) Push [UP] and [DOWN] to set the cursor to "DISCR" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "DISCR" turn red.
- 3) Push [UP] or [DOWN] to select "ON" or "OFF."
 - The selected condition turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "DISCR" turn white.

DISCR "OFF"



DISCR "ON"



Fish school.

Bottom color is removed.

■ Trip log [TRIP LOG]

The trip log can be used for measuring the distance between the reset point and the present point.

This function can be reset whenever you want. An optional EX-983 SPEED/TEMPERATURE SENSOR is necessary for operation.

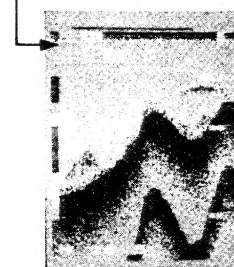
- 1) Push [UP] and [DOWN] to set the cursor on "TRIP LOG" on MENU 1.
- 2) Push [BRT/SET].
 - Cursor and "TRIP LOG" turn red.
- 3) Push [UP] and [DOWN] to select "RST."
 - "RST" turns red.
- 4) Push [BRT/SET] to reset the trip log and re-start.
 - Trip log is set to 0.0 NM and "RST" turns white.
 - "STRT" turns red and trip log begins counting.

The unit of the trip log is subject to "Ship speed" in MENU 3 mode.

Unit of trip log	NM (nautical mile)	KM (kilometer)	MI (mile)
Ship speed	KT (knot)	KM (kilometer/hour)	MI (mile/hour)
Variable range	0.0 ~ 54.0	0.0 ~ 99.9	0.0 ~ 62.0

NOTE: When the trip log counts beyond the variable range, trip log returns to 0.0, then re-counts.

Trip log indication



6-3 MENU 2

All descriptions on pgs. 15 and 16 must be read after selecting the MENU 1 display. See p. 12 for the display selection.

■ Event [EVENT]

This item enables you to select the BASIC + EVENT mode, select the EVENT number to be displayed in that mode, and clear the contents of the EVENT number.

Memorizations will have been previously performed. (p. 11)

Event ON

BASIC + EVENT mode can be activated when the selected EVENT number has contents.

- 1) Push [UP] and [DOWN] to set the cursor to "EVENT" on MENU 2.
- 2) Push [BRT/SET].
 - Cursor and "EVENT" turn red.
- 3) Push [UP] or [DOWN] to select "ON."
 - "ON" turns red.
- 4) Push [BRT/SET] to set the condition.
 - Red "ON" turns green.
 - When you will not be changing the EVENT number, push [MODE] to exit MENU mode.
- 5) Push [UP] and [DOWN] to select the desired EVENT number that is displayed in BASIC + EVENT mode.
- 6) Push [BRT/SET] to set the EVENT number.
 - Cursor and "EVENT" turn white and "ON" turns red.

Event OFF

BASIC + EVENT mode can be deactivated.

- 1) Push [UP] and [DOWN] to set the cursor to "EVENT" on MENU 2.
- 2) Push [BRT/SET].
 - Cursor and "EVENT" turn red.
- 3) Push [UP] or [DOWN] to select "OFF."
 - "OFF" turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "EVENT" turn white.
 - BASIC + EVENT mode cannot be selected until the "EVENT" is set to "ON."

Event clear

Unnecessary EVENT contents can be cleared.

- 1) Push [UP] and [DOWN] to set the cursor to "EVENT" on MENU 2.
- 2) Push [BRT/SET].
 - Cursor and "EVENT" turn red.
- 3) Push [UP] or [DOWN] to select "CLR."
 - "CLR" turns red.
- 4) Push [BRT/SET] to set the condition.
 - Red "CLR" turns green.
 - To cancel the event clearing, push [MODE].
- 5) Push [UP] and [DOWN] to select the desired memory number to be cleared.
- 6) Push [BRT/SET] to clear the contents of the selected EVENT number.
 - The contents of the memory channel are cleared; then, the cursor and "EVENT" turn white, and "OFF" turns red.
 - For clearing other Event numbers, repeat steps 2) ~ 6).

[EXAMPLE]

CLEARING CONTENTS OF EVENT 9

- 1) Push [UP] and [DOWN] to set the cursor to "EVENT" on MENU 2.
- 2) Push [BRT/SET].
 - Cursor and "EVENT" turn red.
- 3) Push [UP] or [DOWN] to select "CLR."
 - "CLR" turns red.
- 4) Push [BRT/SET].
 - "CLR" turns green.
- 5) Push [UP] and [DOWN] several times until EVENT 9 appears.
- 6) Push [BRT/SET].
 - Displayed contents are turned off.
 - "CLR" turns white and "OFF" turns red.
 - Cursor and "EVENT" turn white.
- 7) If you wish to turn EVENT "ON", follow the steps described at left.
- 8) Push [MODE] to select BASIC mode.

■ Alarm

[SHLOW ALM]

[DEEP ALM]

[TEMP ALM]

3 types of alarms are provided on this video sounder.

SHLOW ALM (Shallow alarm)	The alarm sounds when sea bottom appears shallower than the shallow alarm setting.
DEEP ALM (Deep alarm)	The alarm sounds when sea bottom appears deeper than the depth alarm setting.
TEMP ALM (Temperature alarm) A temperature sensor is necessary.	The alarm sounds when the water temperature reaches the setting value.

- 1) Push [UP] and [DOWN] to set the cursor to the desired alarm "SHLOW ALM," "DEEP ALM" or "TEMP ALM" on MENU 2.
- 2) Push [BRT/SET].
 - Cursor and the selected alarm name turn red.
- 3) Push [UP] and [DOWN] to turn ON or OFF the alarm.
- 4) Push [BRT/SET] to set the condition.
 - "ON" or "OFF" turns green and the value turns red.
- 5) Push [UP] and [DOWN] to set the value.
- 6) Push [BRT/SET] to set the value.
 - Cursor and the selected alarm name turn white, and "ON" or "OFF" turns red.

NOTE: When the shallow alarm is set deeper than the deep alarm, the alarm sounds only when the sea floor's depth is between the deep alarm and shallow alarm values.

Depth unit	Variable range
M	0 ~ 900
FT	0 ~ 3000
FM	0 ~ 500
ヒロ (hiro)	0 ~ 600

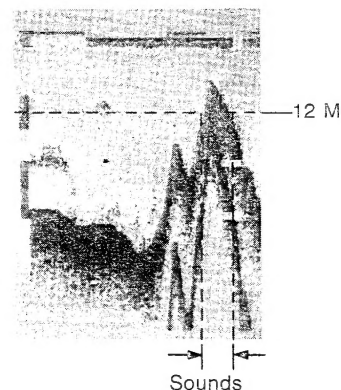
Temp. unit	Variable range
°C	0 ~ + 40
°F	+ 32 ~ + 104

Alarm operation

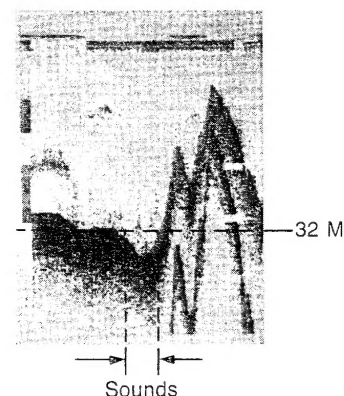
When the sea bottom or the temperature meets the set condition, the alarm sounds.

Push one of the keys on the front panel to stop the alarm.

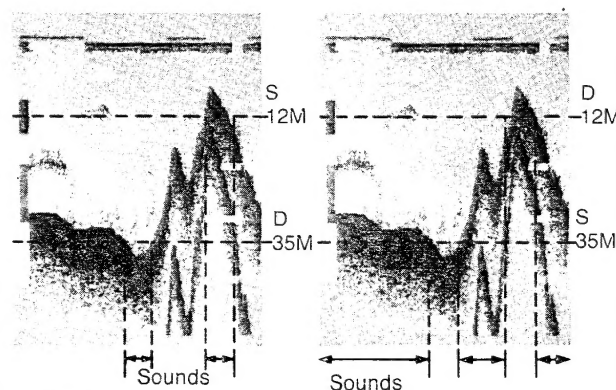
SHALLOW ALARM (Example : 12 M)



DEEP ALARM (Example : 32 M)

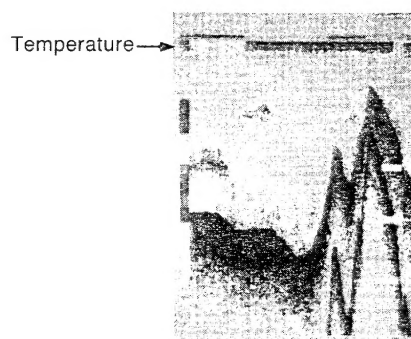


When using shallow and deep alarms



S: Shallow alarm
D: Deep alarm

TEMPERATURE ALARM



6-4 MENU 3

All descriptions on pgs. 17 and 18 must be read after selecting the MENU 3 display. See p. 12 for the display selection.

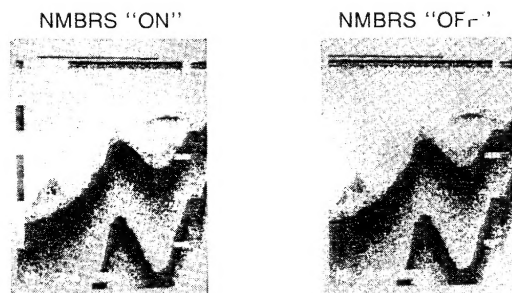
■ Data indication ON/OFF [NMBRS]

The color bar and data indication (water temperature*1, ship speed*1, trip log*1, latitude*2 and longitude*2) can be turned ON and OFF.

*1 An optional EX-983 or EX-1010 is necessary.

*2 Navigation receiver system is necessary.

- 1) Push [UP] and [DOWN] to set the cursor to "NMBRS" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "NMBRS" turn red.
- 3) Push [UP] or [DOWN] to select "ON" or "OFF."
 - The selected condition turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "NMBRS" turn white.



■ Display backing color [BKG COL]

The display backing color is selected as blue or black for your convenience.

- 1) Push [UP] and [DOWN] to set the cursor to "BKG COL" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "BKG COL" turn red.
- 3) Push [UP] or [DOWN] to select "BLUE" or "BLACK."
 - The selected condition turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "BKG COL" turn white.

■ Speed synchronization [SPD SYNC]

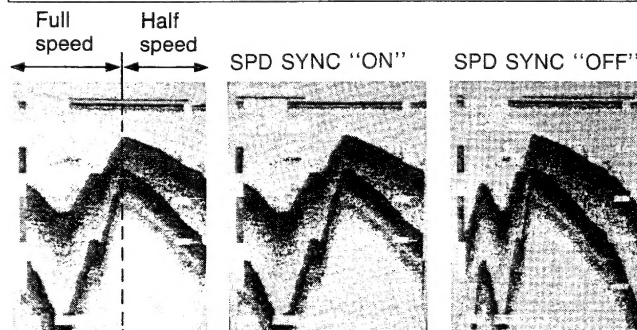
This function synchronizes the display speed with the ship speed.

If the function is ON, the display speed varies depending on the ship's speed.

Even while the ship is stationary, the display advances with low speed.

- 1) Push [UP] and [DOWN] to set the cursor to "SPD SYNC" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "SPD SYNC" turn red.
- 3) Push [UP] or [DOWN] to select "ON" or "OFF."
 - The selected condition turns red.
 - When "ON" is selected, "SPD SYNC" appears in the upper left corner of the display.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "SPD SYNC" turn white.

NOTE: When this function is activated, [DSP SPD] cannot be operated.



■ Unit of water depth [DEPTH]

Meters (M), feet (FT), fathoms (FM) or hiro (ヒロ), are available as the units of water depth.

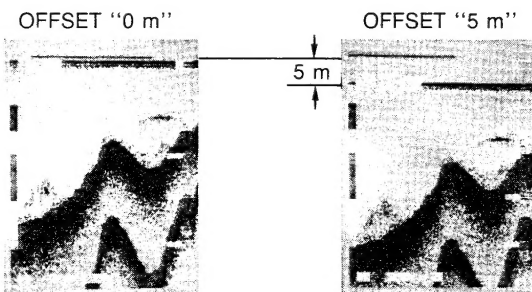
- 1) Push [UP] and [DOWN] to set the cursor to "DEPTH" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "DEPTH" turn red.
- 3) Push [UP] and [DOWN] to select the desired unit.
 - The selected unit turns red.
- 4) Push [BRT/SET] to set the condition.
 - Cursor and "DEPTH" turn white.

■ Draft correction [OFFSET]

The distance between the sea surface and the transducer position (draft) can be compensated for in order to show an accurate display. You will enter this distance (the "draft") in step 3) below.

- 1) Push [UP] and [DOWN] to set the cursor to "OFFSET" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "OFFSET" turn red.
- 3) Push [UP] and [DOWN] to set the distance between the sea surface and transducer position.
- 4) Push [BRT/SET] to set the value.
 - Cursor and "OFFSET" turn white.

Depth unit	Variable range
M (meters)	0.0 ~ 10.0
FT (feet)	0.0 ~ 33.0
FM (fathoms)	0.0 ~ 5.5
ヒロ (hiro)	0.0 ~ 6.6



■ NMEA data [NMEA DATA]

The data of latitude and longitude that are entered from a Loran-C navigation system must be coordinated with the data format of this video sounder.

- 1) Push [UP] and [DOWN] to set the cursor to "NMEA DATA" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "NMEA DATA" turn red.
- 3) Push [UP] and [DOWN] to select the suitable NMEA format, "182" or "183."
 - The selected format turns red.
- 4) Push [BRT/SET] to set the format.
 - Cursor and "NMEA DATA" turn white.

■ Unit of water temperature [TEMP]

Centigrade (°C) or Fahrenheit (°F) can be used as the unit of water temperature.

- 1) Push [UP] and [DOWN] to set the cursor to "TEMP" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "TEMP" turn red.
- 3) Push [UP] or [DOWN] to select the desired unit.
 - The selected unit turns red.
- 4) Push [BRT/SET] to set the unit.
 - Cursor and "TEMP" turn white.

■ Unit of ship speed [SPEED]

Knot (KT), kilometer/hour (KM), or mile/hour (MI) can be used as the unit of ship speed.

- 1) Push [UP] and [DOWN] to set the cursor to "SPEED" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "SPEED" turn red.
- 3) Push [UP] and [DOWN] to select the desired unit.
 - The selected unit turns red.
- 4) Push [BRT/SET] to set the unit.
 - Cursor and "SPEED" turn white.

■ Speed adjustment [SPD ADJ]

The difference between the true speed and the speed detected by a speed sensor can be corrected.

An optional EX-983 or EX-1010 is necessary.

- 1) Push [UP] and [DOWN] to set the cursor to "SPD ADJ" on MENU 3.
- 2) Push [BRT/SET].
 - Cursor and "SPD ADJ" turn red.
- 3) Push [UP] and [DOWN] to select the desired pulse rate in the range of "14000 ~ 24000 PULSE/NM."
- 4) Push [BRT/SET] to set the value.
 - Cursor and "SPD ADJ" turn white.

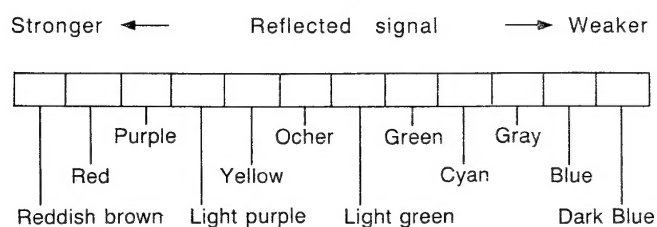
7-1 Description

This section explains the displays which were not covered in the previous sections.

Color bar

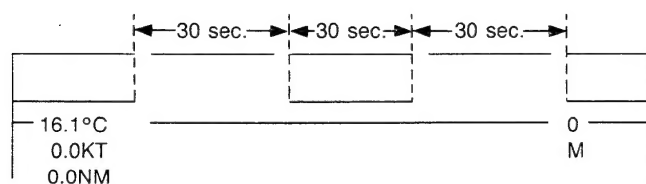
This video sounder displays the intensity of the echo signal in 12 colors as in the following diagram.

- The color bar can be turned off in MENU mode. (p. 17)
- The background color can be selected in dark blue or black. (p. 17)



Time mark

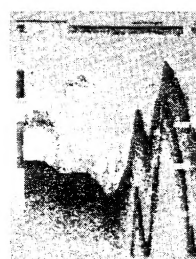
The time mark is displayed every 30 sec. on the upper part of the screen. The time mark indicates the lapse of time.



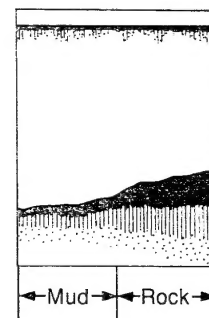
7-2 Echoes from the sea bottom

Echoes from the sea floor are normally the strongest and are displayed in reddish brown, but the color and width will vary with bottom composition, water depth, frequency, sensitivity, etc.

The color of the bottom echo can be used to help determine the density of the bottom material (soft or hard). The harder the bottom, the wider the trace. If the gain is set to show only a single bottom echo on mud, a rocky bottom will show a second or third bottom return.

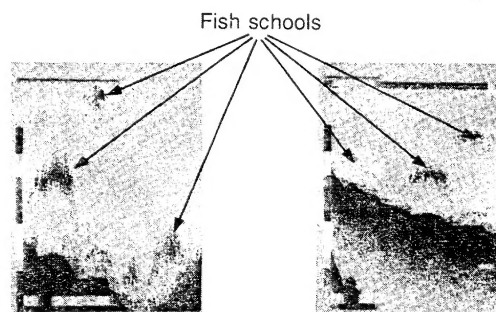


Flat bottom Rough bottom



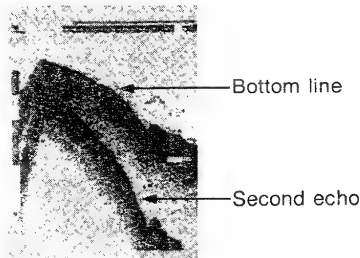
7-3 Fish school echoes

Fish school echoes will generally be plotted between the surface and the sea bottom. Usually the fish school/fish echo is weaker than the bottom echo because the reflection surface and the reflection property are much smaller than compared to the bottom. The size of the fish school can be ascertained from the density of the display.



7-4 Multiple reflection

At relatively shallow depths, a high gain setting and a strong bottom echo will cause a second or sometimes a third or a fourth echo to be displayed in the same interval below the first echo trace. This is because the echo travels between the sea floor and surface two or more times in shallow depths.

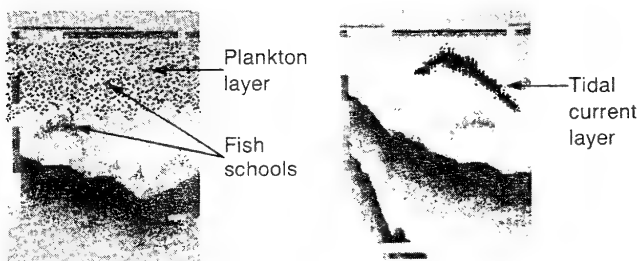


7-5 Plankton and tidal current layers

A plankton layer is made up of schools of marine microbes which are displayed in cloud-like layers between the surface and the sea bottom and may cover a wide depth range.

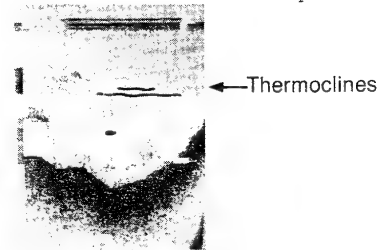
Plankton are an important link in the food chain for most game fish and locating their position can be quite beneficial to productive fishing. Plankton are sensitive to light in the water and, as a result, swim to deep water during the daylight and rise to shallower depths at night.

The picture of the tidal current layer is sloped, though it is similar to the picture of the plankton layer. But, it is not spread over a wide depth range.



7-6 Thermoclines

Thermoclines are layers formed between areas of water at different temperatures. The temperature breakline will sometimes reflect an echo back to the transducer and will appear on the display as a very thin and weak line between the surface and the sea bottom.



7-7 Aeration

When the vessel sails in its own wake as it goes astern or when it sails in waves of a rough sea, aerated water may cover the face of the transducer.

The bottom line may not be displayed due to the reduction of transmission/reception sensitivity of the ultrasonic wave.

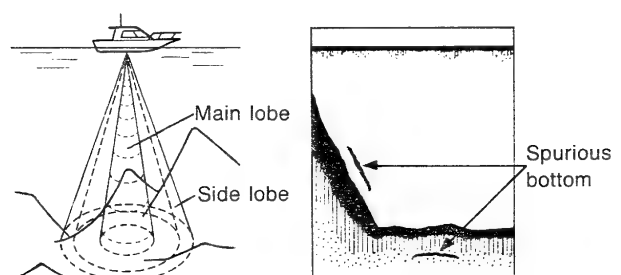


Image caused by aerated mater.

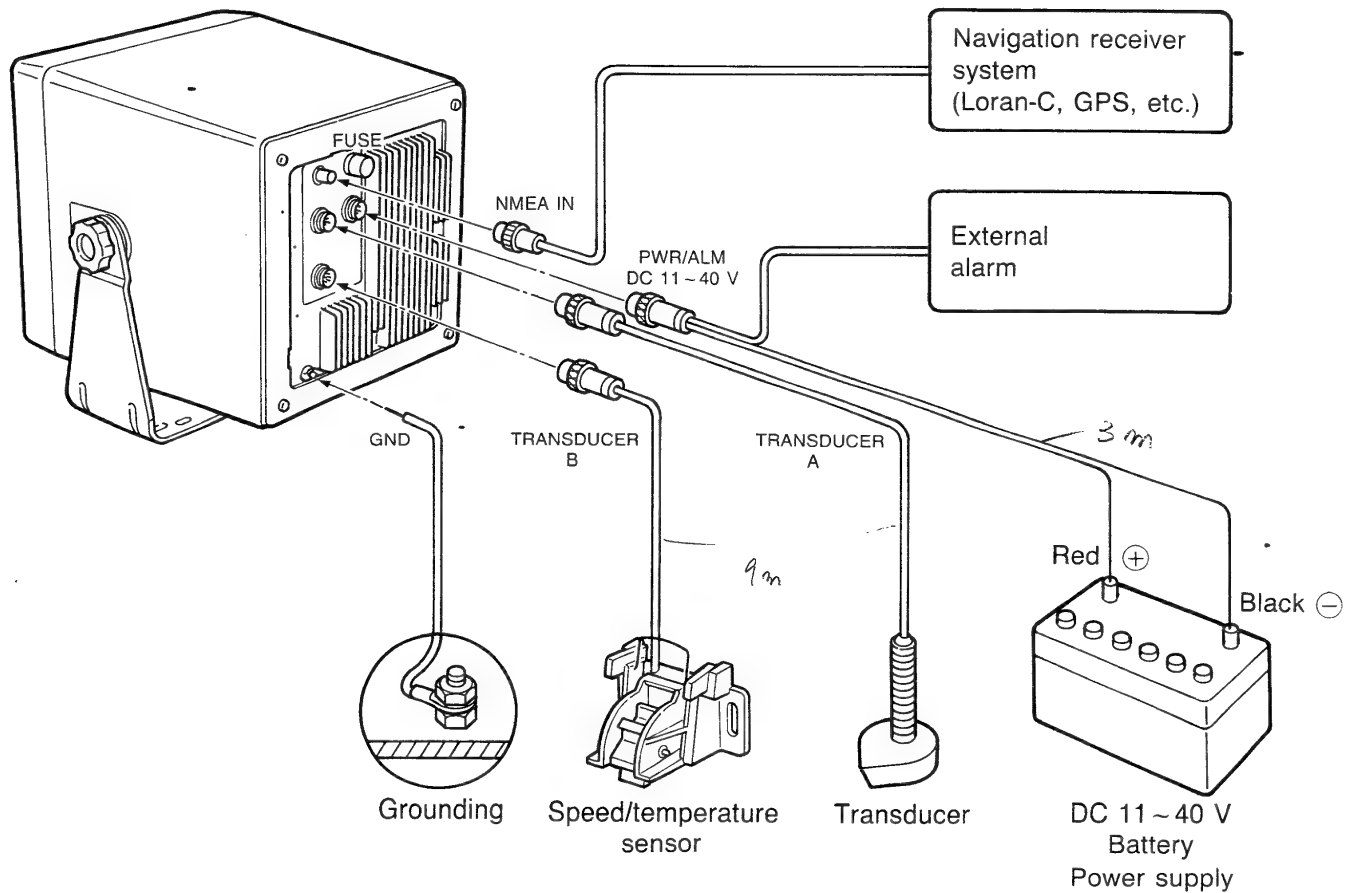
7-8 Spurious bottom lines by side lobes

Spurious bottom lines may appear because the transducer has side lobes.

They appear as weak lines above a rough bottom, or as weak lines beneath a flat bottom.



8-1 Connection diagram



Options

TRANSDUCERS

Transducer	Material	Installation type	Corresponding FF-88 type
EX-980	Plastic	Through-hull	200 W
EX-981	Plastic	Transom	200 W
EX-982	Metal	Through-hull	200 W
EX-1010*	Metal	Through-hull	200 or 600 W

* EX-1010 has speed and temperature sensors.

OTHERS

EX-948 INNER-HULL KIT

Used when installing the EX-980 inside the hull.

EX-983 SPEED/TEMPERATURE SENSOR

Used with the EX-980, EX-981 or EX-982.

8-2 Main unit installation

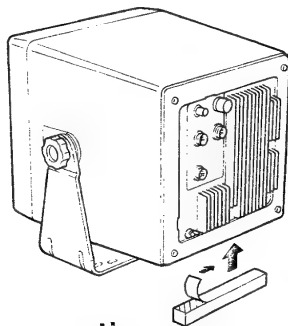
Installation location

- 1) Select a convenient location suitable for easy viewing in a sheltered area and out of direct sunlight.
- 2) The location should have enough space to install the video sounder. Note its dimensions: the space should be large enough for good ventilation.
- 3) It should be free from high temperature, moisture, rain, water spray, vibration and any magnetic field.

Installation method

- 1) On the mounting table, measure the location for the mounting screws and drill 5 holes.
- 2) Attach the mounting bracket to the measured location with self tapping screws.
- 3) Install the video sounder in its mounting bracket.
- 4) Attach the supplied sponge for protection from vibrations, if you desire. See below for attachment.
- 5) At the desired angle position, secure the unit with the mounting screw knobs.

SPONGE ATTACHMENT



Power cable connection

- 1) The video sounder operates with a ship's DC input voltage within the 11 ~ 40 V range.

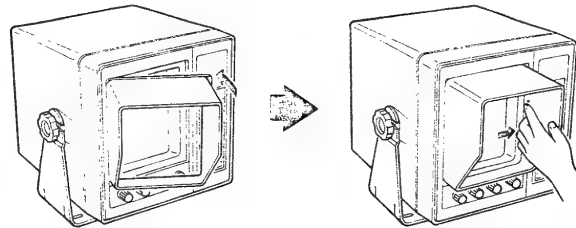
In this case, pay attention to the power polarity. The RED lead of the power cable should be connected to the positive ⊕ and the BLACK lead to the negative ⊖.

Pin No.	Cable color	Connected terminal
1	Red	⊕ (positive)
4	Black	⊖ (negative)

- 2) Connect the power cable to the [PWR/ALM] connector on the rear panel of the video sounder.
- 3) The ship's ground wire should be connected to the [GND] terminal on the rear panel of the video sounder.

8-3 Viewing hood installation

After the installing the main unit, install the supplied viewing cover as shown in the diagram below.



8-4 Transducer and sensor connection

- 1) Connect the cable from the transducer to the [TRANSDUCER A] jack on the rear panel.
- 2) Connect the cable from the speed sensor to the [TRANSDUCER B] jack on the rear panel.
- 3) When connecting a transducer equipped with a speed/temperature sensor, connect the cable to the [TRANSDUCER B] jack on the rear panel.

WARNING: DO NOT try to install a transducer by yourself. Drilling your boat is necessary for installation. If the transducer is installed incorrectly, the boat will sink in the worst case. **BE SURE** to ask your boat dealer to install a transducer.

8-5 Navigation receiver system connection

Connect the cable to the [NMEA IN] jack on the rear panel with a BNC connector.

- The data line must connect with the inside of the [NMEA IN] jack.
The data return line must connect with the outside of the [NMEA IN] jack.

NOTE: The data format must be coordinated. See p. 18 "NMEA data" for details.

8-6 External alarm connection

An external alarm device can be connected to the [PWR/ALM] jack on the rear panel of the video sounder.

Connect the cable from an external alarm to the black and white cable that comes out of the power connector.

NOTE: The internal relay unit (Max. 1 A) is connected to the [PWR/ALM] jack. The relay is turned ON when the alarm sounds.

9-1 Preventive maintenance

WARNING: Be sure to turn POWER OFF before carrying out the preventive maintenance procedures to avoid an accidental electrical shock.

Preventive maintenance will keep the video sounder in good operation, and may be helpful to reduce time loss and servicing expense.

- ① Clean and remove any dirt or dust from the unit cover and control panel with a soft, damp cloth and a little soap.
- ② When cleaning the surface or the CRT and its cover, use a soft cloth (cotton or flannel) soaked with an antistatic substance (e.g. Policare) or fresh water.
- ③ Inspect the connectors and fuse holder for looseness and cleanliness. Tighten the loosened screws, bolts and nuts.
- ④ Check the cable connections and the connection to the ship's ground for cleanliness and tightness. Make sure the wiring is free from chafing or abrasions.
- ⑤ Check for evidence of any corrosion or marine growth on the transducer or its cable and connector. The transducer should be cleaned with a neutral detergent using a soft brush so that any foreign material is removed from the face of the transducer.

9-2 Fuse replacement

All circuits of the video sounder are protected by fuses. If the power switch is pushed ON, and the video sounder will not operate, follow this procedure:

- 1) Remove the blown fuse from the fuse holder on the rear panel.
- 2) If possible, correct the problem, and replace with a new rated fuse.
 - REPLACEMENT FUSE: FGB 5 A

9-3 CPU resetting

The CRT might occasionally display erroneous information (e.g. when first applying power). This may have been caused externally by static electricity or other factors.

NOTE: CPU resetting clears all settings and memorized event contents.

- 1) Turn power OFF.
- 2) While pushing [UP] and [DOWN], turn power ON.
- 3) Release switches.

9-4 Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
• No power comes on.	• Polarity of the power connection is reversed. • Blown fuse.	• Reconnect the power cable observing the proper polarity. • Check the cause, then replace the fuse.
• No echo or a weak echo display appears.	• Transducer cable has a poor contact. • [GAIN] and [STC] are set too low.	• Check connection of the transducer cable. • Check values of [GAIN] and [STC].
• Display does not advance across the screen.	• The display speed is set at "0".	• Check feed speed of display using the [DSP SPD] switch.
• Display's darkness/brightness keeps changing.	• Battery voltage is low.	• Charge the battery, then operate the video sounder.
• The sea bottom line does not appear on the screen.	• Depth range is set incorrectly. • Phase shift is set incorrectly. • The bottom discrimination function is activated.	• Push [RANGE], then push [UP] or [DOWN] to reset. • Push [SHIFT], then push [UP] or [DOWN] to reset. • Set "DISCR" to "OFF" in MENU mode.
• Water depth is not indicated. • Bottom expansion is not displayed. • AUTO function cannot be activated.	• Sensitivity is set too low.	• Check values of [GAIN] and [STC].
• The screen is distorted.	• Nearby objects with a strong magnetic field.	• Remove the objects.
• Water temperature, ship speed, trip log, latitude and longitude are not indicated.	• An optional EX-983 is not connected or poorly connected. • Navigation receiver system is not connected or poorly connected. • Data indication in MENU mode is set to "OFF."	• Connect the EX-983 correctly. • Connect a navigation receiver system correctly. • Set "NMBS" to "ON" in MENU mode.



- Basic range :

Meters	5	10	20	40	80	160	240	320	640*
Feet	15	30	60	120	250	500	750	1000	2000*
Fathoms	3	5	10	20	40	80	120	160	320*
Hiro	4	8	15	30	60	120	180	250	500*

* 600 W type only 1 ヒロ (Hiro) = 1.515 m
- Bottom expansion range/
part expansion range :

Meters	2	5	10	20	40	80
Feet	6	15	30	60	120	240
Fathoms	1.5	3	5	10	20	40
Hiro	1.5	3	5	10	20	40
- Phase shift variable range :

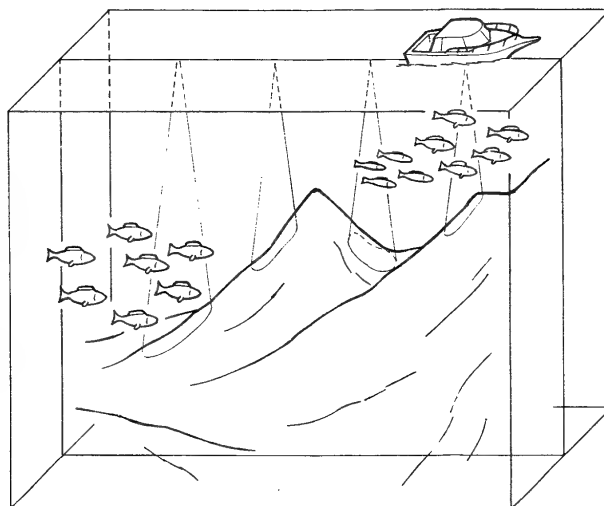
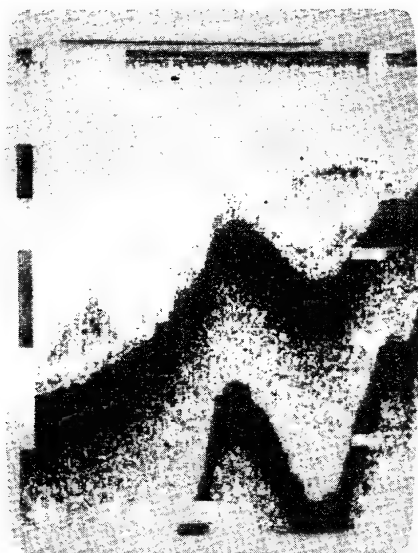
	200 W type	600 W type
Meters	0 ~ 320	0 ~ 640
Feet	0 ~ 1000	0 ~ 2000
Fathoms	0 ~ 160	0 ~ 320
Hiro	0 ~ 250	0 ~ 500
- Display : 8 inch color CRT
- Presentation mode :
 - ① BASIC mode
 - Basic
 - Basic + Bottom expansion
 - Basic + Part expansion
 - ② DUAL mode
 - ③ BASIC + EVENT mode
 - ④ BASIC + COMPASS mode
 - ⑤ MENU mode
- Picture advance speed : Freeze (0), 1 ~ 4 or synchronized with ship speed
- Pulse width : Normal, Long
- Transmission frequency : 50 kHz, 200 kHz
- Output power : 200 W (rms) (200 W type)
600 W (rms) (600 W type)
- Color presentation : 12 colors
- Alarm : Shallow alarm
Deep alarm
Temperature alarm
- Power supply requirement : 11 ~ 40 V DC
- Power consumption : 40 W
- Dimensions : 250 (W) x 250 (H) x 288 (D) mm; 9.8 (W) x 9.8 (H) x 11.3 (D) in
(projections not included)
- Weight : 7.5 kg; 16.5 lb
- Usable temperature range : 0°C ~ +50°C; +32°F ~ +122°F

All stated specifications are subject to change without notice or obligation.

1-1 Theory of the video sounder

This video sounder makes use of an ultrasonic wave which is radiated from the transducer into the sea, and returns like an echo when it hits a medium of different density. So, the video sounder enables you to know the distribution of fish schools, depth of the

water, and shape of the sea bottom by processing and displaying the time and intensity of the echo signal. In general, the velocity of ultrasonic waves in water is dependent upon the water temperature, pressure and salinity, etc.; but 1500 m/sec is generally used.



1-2 Features

• 8 INCH COLOR CRT DISPLAY

The 8 inch high resolution color CRT enables you to detect fish schools of any size, and there are 5 brightness levels to choose from.

• DUAL MODE

The video sounder has 2 oscillators of 200 kHz and 50 kHz, and has a DUAL mode which displays 2 pictures of 200 kHz and 50 kHz simultaneously.

• DATA INDICATION

The speed of your ship, water temperature, your location, etc. can be indicated when optional appliances are connected.

• MENU MODE

The 20(19*) functions that are seldom used, such as noise reduction or interference reduction are performed in MENU mode.

* 200 W type

• DEPTH MARKER INDICATION

Depth marker indication enables you to find the exact depth of fish schools.

• 9 (8*) GRADES OF DEPTH RANGE

You can select water depth range in 9 (8*) grades from 0~5 m to 0~640 (320*) m. And the unit of water depth can be selected from Meters, Feet, Fathoms, etc.

* 200 W type

• AUTOMATIC FUNCTION

This function tracks the sea bottom while controlling depth range and phase shift automatically to prevent the sea bottom from escaping off the screen.

• 3 TYPES OF ALARMS

Shallow, deep and temperature alarms are equipped with the video sounder for your convenience.

• 5 GRADE DISPLAY SWEEP SPEED

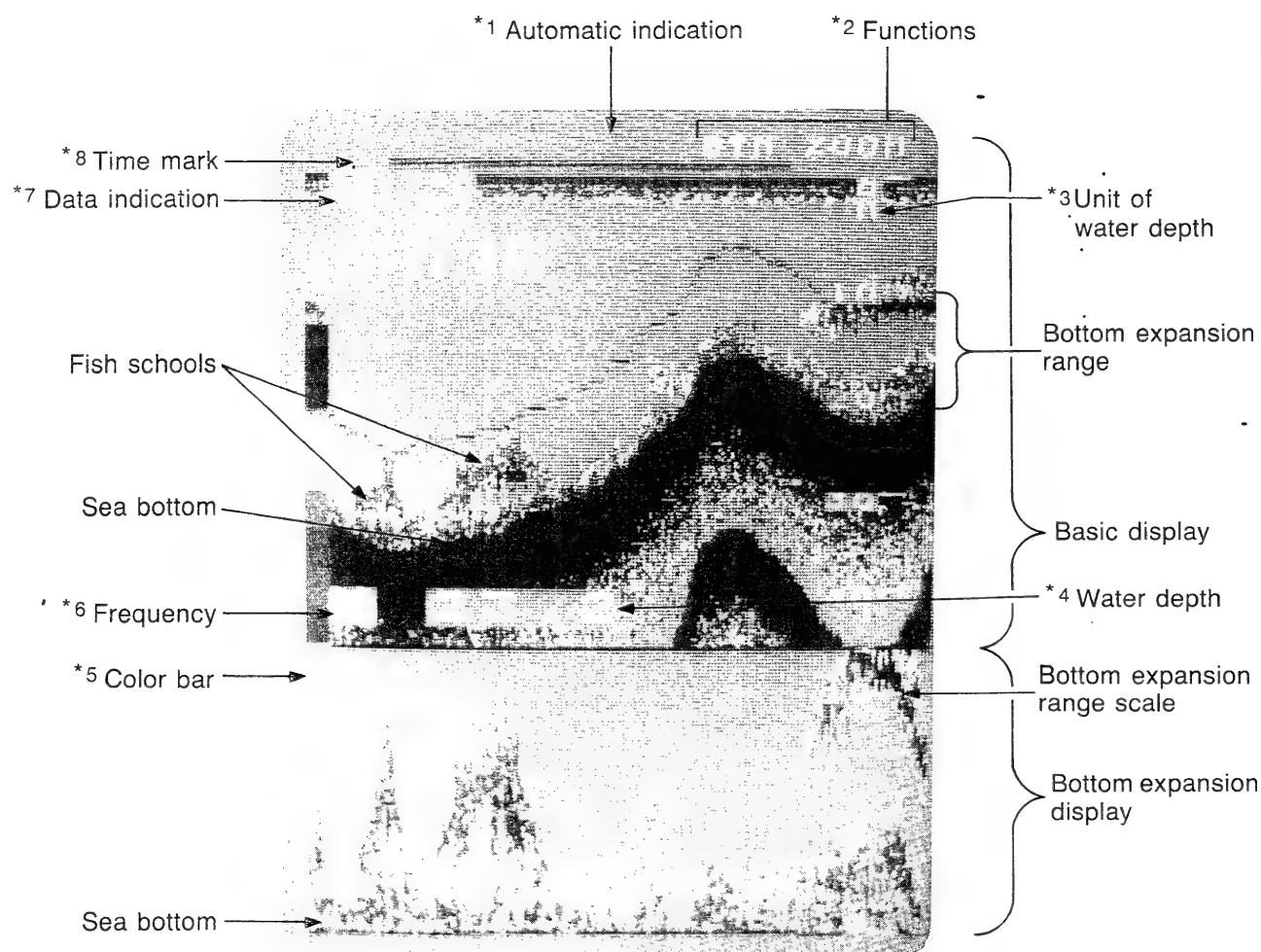
You can select the display sweep speed from 4 different grades, and can also select sweep stop.

• 20 EVENT MEMORY CAPABILITY

Latitude, longitude, water depth and water temperature of 20 important event locations can be memorized by the event function. You can easily recall the event information.

EXAMPLE OF DISPLAY SCREEN

There are 9 kind of screens in this video sounder. The Basic + Bottom expansion display appears as in the below picture. See p. 8 for other displays.



Basic + Bottom expansion display

*1 "AUTO" appears only when the automatic bottom tracking function is activated. (p. 11)

*2 The selected function is indicated.

*3 M : Meters
FT : Feet
FM : fathoms
ヒロ : Hiro; Japanese unit (p. 17)

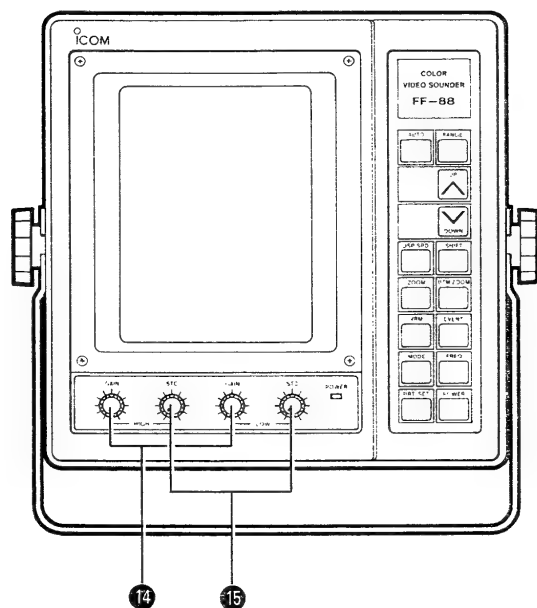
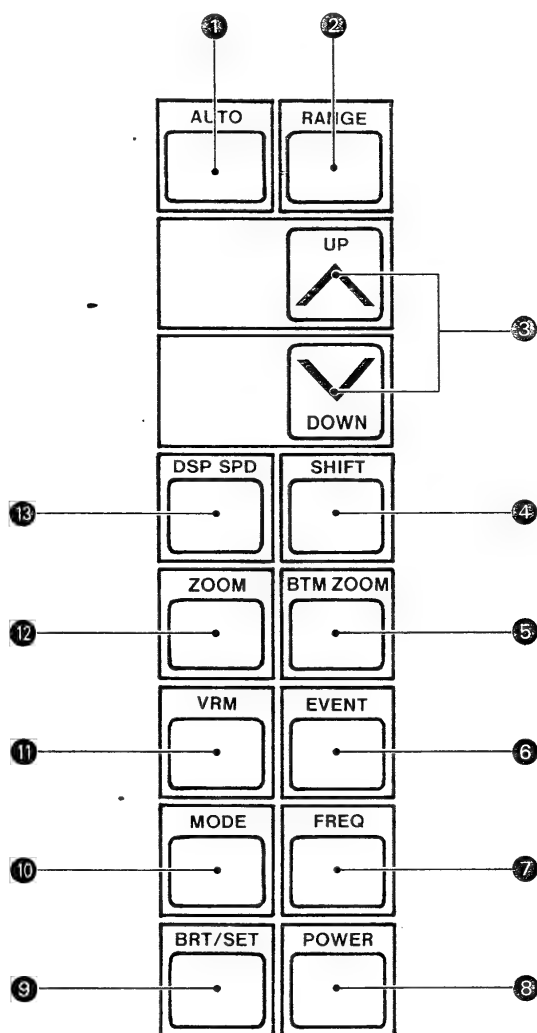
*4 The present water depth is indicated.

*5 Can be turned off if you desire. (p. 17)

*6 H : 200 kHz ultrasonic wave is selected.
L : 50 kHz ultrasonic wave is selected. (p. 17)

*7 Indicate water temperature, ship speed, trip log, latitude and longitude. (Options are necessary.) (p. 17)

*8 Yellow line is displayed every 30 sec. (p. 19)



1 AUTO KEY [AUTO] (p. 11)

Activates the automatic bottom tracking function.

- Red "AUTO" appears in the top center of the screen.

When activating the automatic bottom tracking function, the sounder tracks the sea bottom, while depth range and phase shift are automatically set.

To deactivate the function, push this key again.

- "AUTO" disappears, and manual operation resumes.

2 DEPTH RANGE KEY [RANGE] (p. 6)

Sets the depth range.

- "RANGE" appears in white in the upper right corner of the screen.
- When the automatic bottom tracking function is activated, this key is not applicable.

Use the [UP]/[DOWN] switches to select the desired depth range.

3 UP/DOWN KEYS [UP]/[DOWN]

Select the desired values for depth range, phase shift, bottom expansion, variable range marker, part expansion, display sweep speed and MENU mode.

4 PHASE SHIFT KEY [SHIFT] (p. 6)

Sets the desired phase shift of the depth range.

- "SHIFT" appears in white in the upper right corner of the screen.
- When the automatic bottom tracking function is activated, this key is not applicable.

Use the [UP]/[DOWN] switches to select the desired phase shift.

5 BOTTOM EXPANSION RANGE KEY [BTM ZOOM] (p. 9)

Selects the basic + bottom expansion display and also sets the expansion range on the expansion display.

- "BTM ZOOM" appears in white in the upper right corner of the screen.

Use the [UP]/[DOWN] switches to select the desired range.

To cancel this display, push [MODE].

6 EVENT KEY [EVENT] (p. 11)

Memorizes the latitude, longitude, water temperature and water depth at the present point.

Push and hold the key to memorize.

- "EVENT" and EVENT number appear in the upper right corner of the screen. When the EVENT number changes from red to white, memorizing has been completed.
- When all EVENT numbers contain memory information, "FL" appears instead of EVENT number.

A maximum of 20 events can be memorized.

⑦ FREQUENCY KEY [FREQ] (p. 7)

Selects a frequency of 200 kHz or 50 kHz.

- "H" appears when 200 kHz is selected, "L" appears when 50 kHz is selected.
- 200 kHz is suitable for shallow sea bottom detection, 50 kHz is suitable for deep sea bottom detection.

⑧ POWER KEY [POWER] (p. 5)

Turns power ON and OFF.

- Push the key to turn ON power.
- Push and hold the key for 2 sec. to turn OFF power.

⑨ BRIGHTNESS/SET KEY [BRT/SET] (p. 7)

Selects 1 of the 5 brightness display levels.

Sets the item in MENU mode to change the contents.

⑩ MODE KEY [MODE] (p. 8)

Selects the operating mode.

BASIC mode	There are 3 types of display - Basic display Used for normal operation - Basic + bottom expansion Used for observing the condition of the sea bottom. - Basic + part expansion Used for observing fish schools, etc.
DUAL mode	50 kHz and 200 kHz pictures are displayed simultaneously.
BASIC + EVENT mode	Basic display and selected EVENT contents are shown.
BASIC + COMPASS mode	Basic display and information from the navigation receiver system are shown.
MENU mode	20(19*) sub functions can be used or set. There are 3 types of indication. - MENU 1 - MENU 2 - MENU 3 * 200 W type

⑪ MARKER SWITCH [VRM] (p. 10)

Sets the variable range marker for measuring the exact water depth.

- "VRM" appears in white in the upper right corner of the screen.

Use the [UP]/[DOWN] switches to set the marker to the desired depth.

⑫ PART EXPANSION KEY [ZOOM] (p. 10)

Selects the basic + part expansion display and also sets the expansion range down.

- White "ZOOM" appears in the upper right corner of the screen.

Use [VRM] to select the desired expansion area.

Use the [UP]/[DOWN] switches to select the desired range.

To cancel this display, push [MODE].

⑬ DISPLAY SWEEP SPEED KEY [DSP SPD] (p. 9)

Sets the sweep speed of the display in 1 of 5 steps, ranging from DSP SPD 4 ~ DSP SPD 0.

- An indication of the grade "DSP SPD 4" ~ "DSP SPD 0" appears in white in the upper right corner of the screen.

Use the [UP]/[DOWN] switches to select the desired speed.

⑭ SENSITIVITY CONTROLS [GAIN] (p. 6)

Adjust the receive sensitivity of the display. One is for 50 kHz (L), and the other is for 200 kHz (H).

- When increasing sensitivity, rotate the suitable [GAIN] control clockwise.
- When decreasing sensitivity, rotate the suitable [GAIN] control counterclockwise.

⑮ SENSITIVITY TIME CONTROLS [STC] (p. 7)

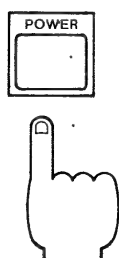
Adjust the receive sensitivity of the outer layer. One is for 50 kHz (L), and the other is for 200 kHz (H).

- When decreasing sensitivity of the outer layer for bubble erasing, rotate the suitable [STC] control clockwise.
- When increasing sensitivity, rotate the suitable [STC] control counterclockwise.

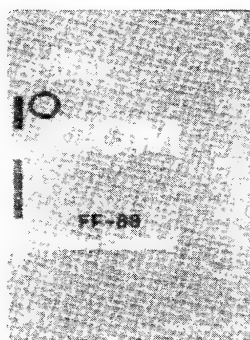
4-1 Power ON/OFF

- 1) Push [POWER] to turn ON power.
 - Beep sound is emitted, and "ICOM" appears. Then "ICOM" moves to the left, and a display follows.
- 2) The video sounder is activated with all settings such as mode, depth range, phase shift, etc. which are set in previous use.
- 3) To turn OFF power, push and hold [POWER] for 2 sec.

Power ON.



"ICOM" appears.



Display appears.

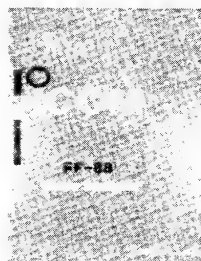


4-2 Minimum operation

The following operation is required for using this video sounder.

- 1) Push [POWER] to turn power ON. (See above.)
- 2) Select the Basic display in BASIC mode.
 - The basic display has a complete long range depth scale. If another display or mode has been selected, push [MODE] several times to select the basic display. (p. 8)
- 3) Push [RANGE], then set the desired display range. (p. 6)
- 4) Push [SHIFT], then set the desired phase shift. (p. 6)
- 5) Set [STC] fully counterclockwise. (p. 7)
- 6) Rotate [GAIN] of the selected frequency to adjust the sensitivity. (p. 6)

[POWER]



[MODE]



[RANGE]



[SHIFT]



[STC]
[GAIN]



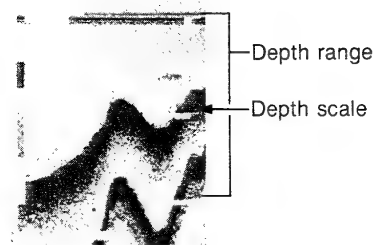
4-3 Depth range setting

Set the depth range of the display.

- 1) Push [RANGE].
 - "RANGE" appears.
- 2) Push [UP] and [DOWN] to select the desired depth range.
 - The depth range scale shifts according to [UP] and [DOWN].

The following 4 units can be used and these units can be selected in MENU 3 (p. 17)

- M (Meters)
- FT (Feet)
- FM (Fathoms)
- ヒロ (Hiro: Japanese unit)

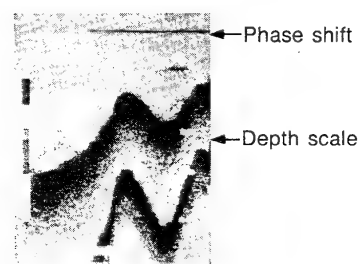


4-4 Phase shift setting

Set the point where the depth range of the display should begin.

If a 20 m phase shift is set while 0 ~ 40 m depth range is selected, the screen shows a 20 ~ 60 m depth range display.

- 1) Push [SHIFT].
 - "SHIFT" appears.
- 2) Push [UP] and [DOWN] to set the desired phase shift.
 - The starting point of the picture shifts.



4-5 Sensitivity adjustment

Adjusts the sensitivity of the signal strength reflecting from the sea bottom. Sensitivities of the 50 kHz and 200 kHz ultrasonic waves are adjusted separately.

BE SURE to adjust the sensitivity. This is very important in obtaining the best picture.

Rotate the [GAIN] control of the selected frequency to make the color of the sea floor reddish brown and to eliminate the sea noise (blue).

- To increase the sensitivity, rotate the control clockwise.



4 BASIC OPERATION

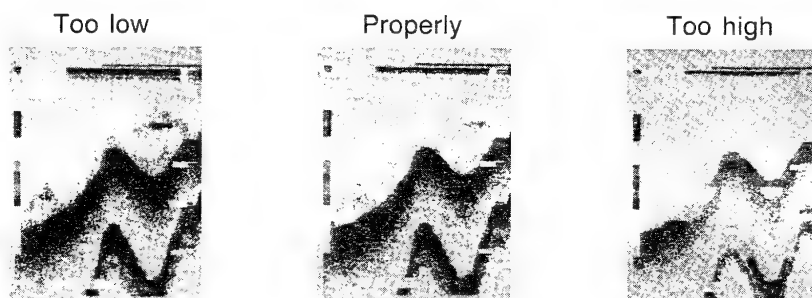
4-6 Sensitivity of outer layer adjustment

If you want to erase the outer layer noise caused by bubbles, rotate [STC] clockwise to the desired position.

[STC] decreases the sensitivity of the outer layer to remove noise and to obtain a clear picture.

NOTE 1: If [STC] is rotated too far clockwise, [STC] affects the [GAIN] on the shallow sea bottom.

NOTE 2: [STC] is not effective when the phase shift is set to more than 5 m.



4-7 Frequency selection

Select a frequency, 50 kHz or 200 kHz for your convenience.

This key is available in BASIC, BASIC + EVENT and BASIC + COMPASS modes.

200 kHz display



↑ "H" appears.

50 kHz display



↑ "L" appears.

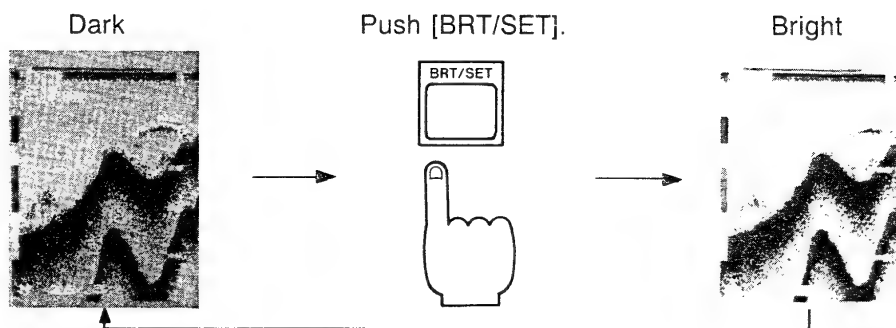
- "H" appears when 200 kHz is selected.
200 kHz is suitable for finding density of fish schools and finding fish on the sea bottom.
- "L" appears when 50 kHz is selected.
50 kHz is suitable for searching large areas and examination of bottom geology.

4-8 Brightness adjustment

Push [BRT/SET] to select 1 of 5 display levels.

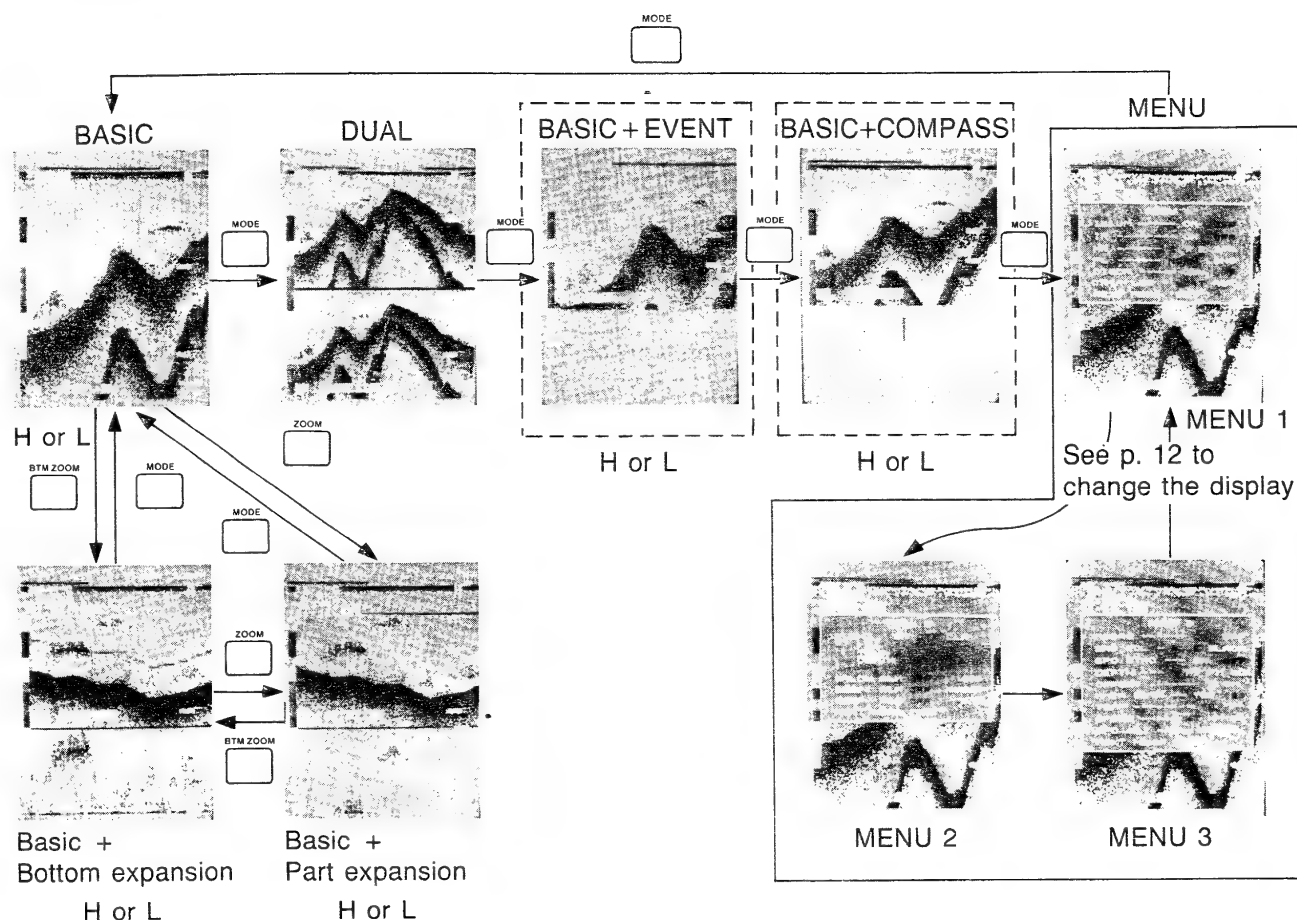
NOTE 1 If you use the video sounder with high brightness for a long time, the life of the CRT display is shortened.

NOTE 2 When the MENU mode is selected, the brightness is fixed automatically and cannot be changed.



4-9 Mode selection

The following 5 modes are available.
Push [MODE] to select the desired mode.



BASIC mode

- Basic display
Shows the basic display on the whole screen according to the value of [SHIFT] and [RANGE].
- Basic + Bottom expansion
Shows the basic and bottom expansion displays simultaneously and is convenient for observing the condition of the sea bottom. See p. 9 for details.
- Basic + Part expansion
Shows the basic and part expansion displays simultaneously and is convenient for observing fish schools, etc. See p. 10 for details.

DUAL mode

Shows 200 kHz (H) and 50 kHz (L) displays simultaneously.

BASIC + EVENT mode

Shows the basic display and selected EVENT contents.

- Only selectable when EVENT is ON in the MENU mode (MENU 2) and an event has been memorized.

BASIC + COMPASS mode

Shows the basic display and position and bearing.

- Only selectable when a navigation receiver system with the NMEA 183 data format has been connected.

MENU mode

Used for setting sub functions that are seldom used. Three menu displays are available. See p. 12 for details.

5-1 Display speed setting

The sweep speed of the display can be set in 1 of 5 steps.

- When high speed is selected, the display is expanded horizontally and you can analyze the display easily.
- When slow speed is selected, the display is reduced horizontally.

- 1) Push [DSP SPD].
 - "DSP SPD" and a number appears in the upper right corner of the display.
- 2) Push [UP] and [DOWN] to select the desired speed.

Indication	0	1	2	3	4
Speed	Freeze	Slow	~		Fast

NOTE: When speed synchronization is activated, [DSP SPD] is not operational.

DSP SPD 2



DSP SPD 4



5-2 Range of bottom expansion setting

The bottom expansion function locks the bottom line horizontally and gives you bottom expansion display for easy observation near the sea bottom.

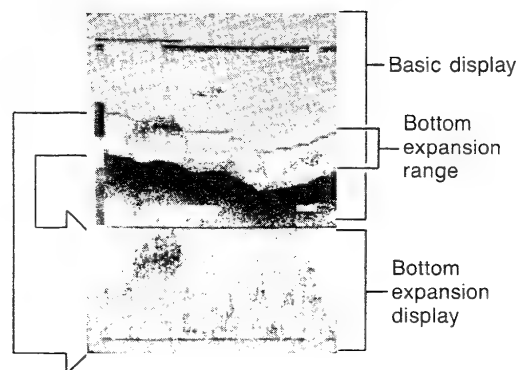
The range of bottom expansion display can be set in 6 steps.

- 1) Push [MODE] several times to select the BASIC mode.
- 2) Push [BTM ZOOM].
 - "BTM ZOOM" appears in the upper right corner of the display.
 - The basic display changes to the basic + bottom expansion display.
- 3) Push [UP] and [DOWN] to select the range from the sea bottom for bottom expansion.
- 4) Push [MODE] to return to the basic display.

NOTE1: If you are viewing the basic + bottom expansion display and want to change the range of bottom expansion after changing range or shift, repeat steps 2) and 3).

NOTE2: When the sea bottom line does not appear on the basic display because of, for example, incorrect phase shift setting, etc. the bottom expansion display does not appear.

Basic + bottom expansion display

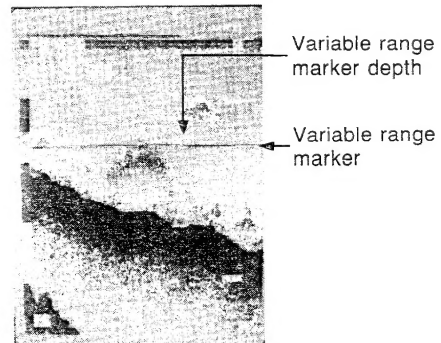


Depth unit	Range of bottom expansion					
M	0~2	0~5	0~10	0~20	0~40	0~80
FT	0~6	0~15	0~30	0~60	0~120	0~240
FM	0~1.5	0~3	0~5	0~10	0~20	0~40
ヒロ (hiro)	0~1.5	0~3	0~5	0~10	0~20	0~40

5-3 Depth measuring

Exact water depth of fish schools, sea bottom, etc. can be measured exactly except when operating in MENU mode.

- 1) Push [VRM].
 - The variable range marker and the digital depth indication appear on the display.
- 2) Push [UP] and [DOWN] to set the variable range marker.
 - The digital depth indication shows the water depth of the variable range marker.

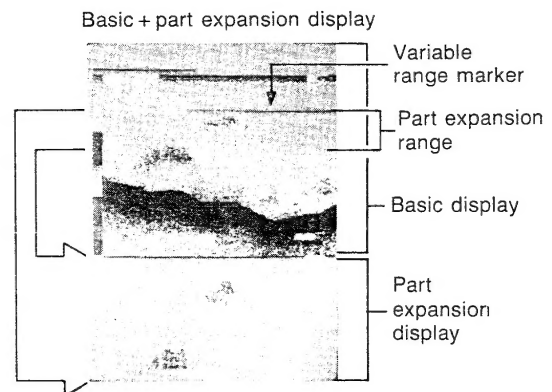


5-4 Range of part expansion setting

The part expansion function provides expansion display below the variable range marker for detailed observation of underwater activity such as fish schools.

The range of part expansion display can be set in 6 steps.

- 1) Push [MODE] several times to select the BASIC mode.
- 2) Push [VRM].
 - "VRM" appears in the upper right corner of the display, and the variable range marker appears.
- 3) Push [UP] and [DOWN] to set the variable range marker to the upper part of the part expansion.
- 4) Push [ZOOM].
 - "ZOOM" appears in the upper right of the function display.
 - The basic display changes to the basic + part expansion display.
- 5) Push [UP] and [DOWN] to select the range of part expansion.
 - The variable range marker can be changed using [VRM] and [UP]/[DOWN].
- 6) Push [MODE] to return to the basic display.



NOTE: If you are displaying the part expansion indication and want to change the range of part expansion after changing range or shift, repeat steps 4) and 5).

Depth unit	Range of part expansion					
M	0 ~ 2	0 ~ 5	0 ~ 10	0 ~ 20	0 ~ 40	0 ~ 80
FT	0 ~ 6	0 ~ 15	0 ~ 30	0 ~ 60	0 ~ 120	0 ~ 240
FM	0 ~ 1.5	0 ~ 3	0 ~ 5	0 ~ 10	0 ~ 20	0 ~ 40
ヒロ (hiro)	0 ~ 1.5	0 ~ 3	0 ~ 5	0 ~ 10	0 ~ 20	0 ~ 40

5 ADVANCED FUNCTIONS

5-5 Event function

The event function memorizes information for a maximum of 20 event locations.

- Water depth is memorized when water depth indication (p. 2) appears.
- Latitude and longitude are memorized when a navigation receiver system is connected.
- Water temperature and water depth are memorized when an optional EX-983 SPEED/TEMPERATURE SENSOR is connected.

NOTE: While operating in MENU mode, memorization is not possible.

Event programming

- 1) Push [EVENT].
 - “EVENT” appears in the upper right corner of the display.
- 2) Push and hold [EVENT] for 2 sec.
 - Red EVENT number appears next to “EVENT” during memory writing.
 - The lowest number blank EVENT memory is used.
 - When there is no blank EVENT memory, “FL” appears. For EVENT memory clearing, see p. 15.
- 3) The red EVENT number turns white when memory writing has been finished.

- 4) For calling up a memorized EVENT, operate “EVENT” in MENU 2. (p. 15) Then select BASIC + EVENT mode.

NOTE: BASIC + EVENT mode indicates the EVENT contents that have been selected at “EVENT” in MENU mode.

BASIC + EVENT mode activation

For BASIC + EVENT mode activation, “EVENT” in MENU mode must be turned ON.

Follow the procedure described below.

- 1) Select MENU mode.
- 2) Select MENU 2 display.
- 3) Select “EVENT.”
- 4) Set “EVENT” to ON.
- 5) Select the EVENT number to be displayed in BASIC + EVENT mode.
- 6) Select BASIC + EVENT mode.

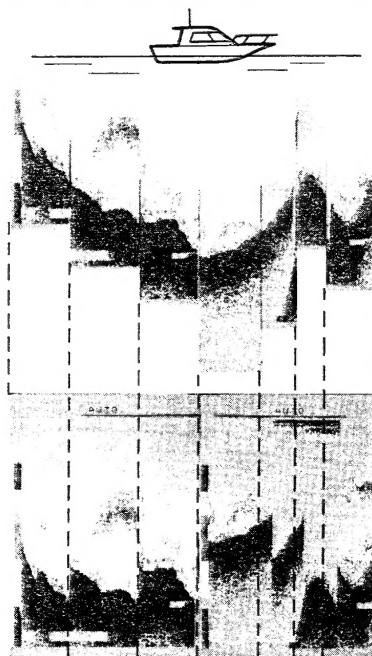
See p. 15 for setting details.

5-6 Auto function

The auto function controls depth range and phase shift automatically.

When examining the sea bottom, you must manually adjust the depth range and phase shift matching to bottom undulations. Or, you could select the auto function to do this job automatically.

- 1) Make sure the sensitivity is a suitable value. Adjust it with the [GAIN] control. (p. 6)
 - Check that the bottom color is reddish brown.
- 2) Push [AUTO].
 - Red “AUTO” appears in the top center of the display.
 - When the auto function is activated, [RANGE] and [SHIFT] cannot be used.
- 3) To deactivate the function, push [AUTO] again.



6-1 Display selection and sub functions

MENU mode is used for setting the contents of the sub functions that are seldom used.

NOTE: Set the contents of all the sub functions when you use this video sounder for the first time.

- 1) Push [MODE] several times until MENU 1 display appears.
- 2) Push [UP] and [DOWN] to select the desired item.
 - To select MENU 2 or 3, set the cursor to [NEXT MENU "SET"], then push [BRT/SET].
- 3) Push [BRT/SET] to select the item to be set.
 - The item turns red.
- 4) Push [UP] and [DOWN] to choose the content of the selected item.
- 5) Push [BRT/SET] to set the content and exit the setting condition.
- 6) If you want to set the other items, repeat 2)~5).
- 7) Push [MODE] to return to BASIC mode.

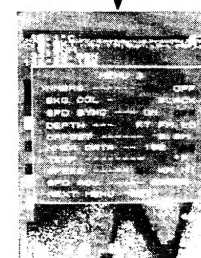
MENU 1



MENU 2



MENU 3



Set the cursor to [NEXT MENU "SET"], then push [BRT/SET] to change the menu display.

• MENU 1 (pgs. 13, 14)

Sub function	Indication	Contents
Key panel backlighting	[ILLUM]	ON, OFF
Interference reduction	[IR]	ON, OFF
Noise reduction	[NR]	0, 1, 2, 3, 4
Transmission pulse	[PL]	NORM, LONG
Transmit power*1	[TX PWR]	MIN, MED, MAX
Bottom discrimination	[DISCR]	ON, OFF
Trip log	[TRIP LOG]	STRT, RST

• MENU 2 (pgs. 15, 16)

Sub function	Indication	Contents
Event	[EVENT]	ON, OFF, CLR
Shallow alarm	[SHLOW ALM]	OFF, 0~900 M *2
Depth alarm	[DEEP ALM]	OFF, 0~900 M *2
Temperature alarm	[TEMP ALM]	OFF, 0~40°C *3

• MENU 3 (pgs. 17, 18)

Sub function	Indication	Contents
Data indication	[NMBRS]	ON, OFF
Display back color	[BKG COL]	BLUE, BLACK
Speed synchronization	[SPD SYNC]	ON, OFF
Unit of water depth	[DEPTH]	M, FT, FM, ㄆㄣ
Draft correction	[OFFSET]	0.0~10.0 M *2
NMEA data	[NMEA DATA]	182, 183
Unit of water temperature	[TEMP]	°C, °F
Unit of ship speed	[SPEED]	KT, KM, MI
Speed correction	[SPD ADJ]	14000~24000

*1 Only for 600 W type.

*2 The unit can be changed at [DEPTH] in MENU 3.

*3 The unit can be changed at [TEMP] in MENU 3.

Count on us!

